

A Summary of the Third Great Lakes Briefs of Invasive Organisms Traded In Commerce Symposium: Bringing Together Aquatic Invasive Species Managers and Law Enforcement Staff

June 15th-17th, 2021

Hosted by The Great Lakes Sea Grant Network, the Great Lakes Panel on
Aquatic Nuisance Species, and the Great Lakes Fishery Commission

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Executive Summary

As the management of invasive organisms in trade (OIT) and their pathways have become more important, the need for aquatic invasive species (AIS) program managers and law enforcement (LE) staff to better communicate and coordinate has become clear. Both have well-defined roles in managing OIT issues and pathways, and close coordination could make these management and law enforcement efforts as effective as possible. However, this close coordination has not always been the norm, with instances where lack of communication and coordination have made management efforts more difficult than needed. The third Great Lakes “Briefs on Invasive Organisms Trade in Commerce” (GL BIOTIC) symposium was held to support information sharing and coordination between AIS program managers and LE staff.

Prior to the symposium, a targeted group of AIS managers and law enforcement staff from across the Great Lakes region was surveyed by the symposium planning team to better understand the coordination needs of these groups. Each Great Lakes state was represented, multiple US federal agencies, federal and provincial Canadian governments, and a tribal nation were represented. The job roles of respondents were fairly evenly distributed between project management, regulation development, law enforcement and education/outreach. Highlighted survey findings included:

- Across the pathways, most agencies had the authority to observe what the public can see, follow up on what the public can see, conduct site visits, and act on what they observe. Only a few were able to require registration of vendors, permitting, or reporting of stocks.
- Of the programmatic actions that were included about in the survey, respondents generally believed that programs were doing a good job investigating violations and issuing citations for those violations – though there was a lot of uncertainty associated with these responses.
- Respondents were especially interested in learning more about prioritizing OIT pathways for enforcement and AIS training for LE.

The symposium consisted of presentations on case studies from participants, followed by small group discussions to process the information and brainstorm possible solutions. The first day included case studies that involved LE staff and AIS managers working together to address OIT issues, what went well, and what could have been improved. In one example, regulations were revised to better support enforcement of illegal transport of invasive carp. An investigation of a major pet crayfish distributor highlighted the importance of addressing OIT issues across jurisdictions and the need to document outreach efforts to support potential prosecution. Communication protocols should be formalized to ensure the right people across agencies are being contacted for OIT issues. There is a need to break down silos in agencies and work better across agencies and entities working on the same issues. Some jurisdictions have cross-disciplinary coordination groups to address invasive OIT while others are coordinating with local partners to educate retailers and support enforcement. There is also an overarching need for increased outreach and communications on OIT issues. More industry involvement is needed, with a specific need to engage more with pet stores.

The second day of the symposium focused on tools to improve knowledge and detection of species in the OIT pathway for invasive species. Some jurisdictions have developed species identification guides of species in the live bait trade to assist LE. A basin-wide print and online guide to help officers and pet store workers identify species would be very useful. Others have used DNA testing methods to screen for invasive species in sellers' tanks. Ontario regulations allow inspectors to issue a compliance order to a seller that requires sellers to take specific actions to prevent or reduce the likelihood of spread of an invasive species; they gave an example in which DNA testing allowed them to issue such an order. Further work would be needed to understand if and how eDNA could be used in court cases. Michigan recently updated their regulations to require sellers of live organisms to be registered and to annually report species sold to state agencies. Finally, some jurisdictions have dedicated or assigned LE units for addressing invasive species pathways such as OIT, though none of these LE staff focus on invasive species pathways full-time.

Presentations for day three of the OIT symposium were focused on the response to the 2021 discovery of zebra mussels in marimo moss balls. This case study provided a unique opportunity to use a recent example that many meeting attendees had experience with. Presenters described response efforts across the U.S., Canada, groups of western U.S. states, Indiana, and Wisconsin. Voluntary actions by industry helped make the situation more manageable in both countries. While overall response efforts were successful, several challenges were described. Sharing of information between partners was complicated in the U.S. by this being an active LE investigation. A nationally coordinated early detection and response framework or Incident Command System, as was used in the Canadian and western U.S. states responses, would have benefited the U.S. response. In Canada, most Department of Fisheries and Oceans fishery officers are located near coasts and fishery operations, which made it difficult to address inland issues. An unforeseen challenge was the need for an emergency use registration from the Pest Management Regulatory Agency for the use of salt and bleach to treat aquaria. It was at first difficult to reach e-commerce retailers. Some states do not have accurate lists of pet stores, as there are not associated licensing or registration requirements. Managers and law enforcement staff should consider what can be done to support legislation that might help states and the federal government respond to similar issues in the future.

Across the discussion groups there was broad support for additional and more formalized communications between LE and AIS managers. Continued joint law enforcement and AIS manager meetings will promote stronger relationships and understanding of case studies in advance of crises and necessary actions.

Purpose

As the management of invasive organisms in trade (OIT) and their pathways have become more important, the need for aquatic invasive species (AIS) program managers and law enforcement (LE) staff to better communicate and coordinate has become clear. Both have well-defined roles in managing OIT issues and pathways, and close coordination could make these management and law enforcement efforts as effective as possible. However, this close

coordination has not always been the norm, with obvious instances where lack of communication and coordination have made management efforts more difficult than necessary.

To address these concerns, the Great Lakes Sea Grant Network (GLSGN), the Great Lakes Panel on Aquatic Nuisance Species (GLP), and the Great Lakes Fishery Commission Law Enforcement Committee (Law Committee) partnered to host the third Great Lakes Briefs on Invasive Organisms Traded in Commerce (GL BIOTIC) Symposium focusing on information sharing and coordination between AIS program managers and LE staff.

Specifically, the goals of this third GL BIOTIC Symposium included:

- Establish a forum for information sharing between LE staff and AIS program managers on OIT issues
- Better understand where coordination between AIS program managers and LE staff is succeeding and where it can be improved
- Determine additional information and training needs for AIS program managers and LE staff

This symposium was supported by funding from the NOAA National Sea Grant Office Special Events Competition and through in-kind support from the GLP and the Great Lakes Fishery Commission.

Issue Background

The Great Lakes region has a strong history of coordinating across jurisdictions on OIT issues. In 2003, Minnesota Sea Grant lead a \$400k GLASN project that leveraged \$1.1 million from PIJAC to develop a pet industry AIS outreach campaign. This led to the development of Habitattitude, which was launched in 2004 and initially had 250 partners join. In the three years after the Habitattitude launch, millions of people were reached with the Habitattitude message. Unfortunately, after 2007, decreasing investment in Habitattitude outreach efforts made the campaign loose momentum. GLRI funding reinvigorated the campaign and OIT outreach within the Great Lakes. \$1.3 million of GLRI funding for Habitattitude from 2011 to 2019 reached 10.6 million people regionally and led the creation of pet surrender and rehoming events. Additional funding helped Illinois-Indiana Sea Grant create TakeAIM.org which helps consumers make better decisions on plant and animal purchase. This funding also led to the Great Lakes Sea Grant Network hosting two OIT-focused symposia, the first Great Lakes Briefs on Invasive Organisms Traded in Commerce Symposium held in Milwaukee, WI in 2014 and the second GL BIOTIC Symposium held in Rochester, MN in 2018.

The first Great Lakes Briefs on Invasive Organisms Traded in Commerce (GL BIOTIC) Symposium was held in Milwaukee, Wisconsin, in June of 2014. This first-of-its-kind symposium, led by the Wisconsin and Minnesota Sea Grant Programs, identified research gaps to improve management of OIT and facilitated the efficient transfer of information between researchers, managers, educators, OIT industries/associations and the public. Presentations

focused on specific OIT invasion pathways and highlighted work being done on topics relating to risk assessment, regulations, outreach and industry efforts. A synthesis website of the first GL BIOTIC Symposium, which includes links to the presentations and a summary fact sheet, can be found [here](http://seagrant.wisc.edu/OIT) (seagrant.wisc.edu/OIT).

A second GL BIOTIC Symposium, also led by the Wisconsin and Minnesota Sea Grant Programs, was held in conjunction with the Upper Midwest Invasive Species Conference in Rochester, Minnesota, in 2018. The second symposium featured a workshop on pet rehoming events and outreach associated with OIT issues. Other sessions focused on risk assessment of OIT species, the impacts and costs of responding to OIT invasions, industry perspectives and the live bait pathway. Presentation files can be found on the UMISC 2018 website [here](https://www.mipn.org/umisc-2018/) (https://www.mipn.org/umisc-2018/).

The Great Lakes Fishery Commission Law Enforcement Committee has also been active promoting additional enforcement efforts for regulations designed to protect against the impacts of AIS. The Law Enforcement Committee has developed excellent working relationships among the agency representatives, leading to quick responses, thorough investigations, and successful prosecutions of violations in various AIS in trade industries crossing state/provincial/national borders. The passing of a 2017 resolution by the Council of Great Lakes Governors and Premiers called for greater enforcement of AIS regulations and it called on all agencies to join the Joint Forces Committee. The Joint Forces Committee is a tool to aid in interjurisdictional relationships among law enforcement staff. Most state and federal natural resources law enforcement agencies in the Great Lakes Region have signed onto this agreement. In the past three years these have included a nationwide distribution network of the self-cloning marbled crayfish in the aquarium industry, large scale distribution of the red swamp crayfish in the food industry, three state distribution of numerous invasive crayfish species in the pet trade, transportation/sales of Asian carp from the commercial/wholesale fishing industry, and illegal transport of baitfish from Ontario involving multiple jurisdictions

When the need for increased coordination between LE staff and AIS program managers became more clear, the GL BIOTIC Symposium format was a logical choice for establishing a forum for the information sharing and coordination needed to begin to address OIT management and law enforcement concerns. On behalf of the GLP OIT Committee, the GLSGN applied for a grant from NOAA National Sea Grant Office to host a third GL BIOTIC Symposium to address these issues. After being awarded funding from the National Sea Grant Office, the GLP OIT Committee developed and administered a survey to LE staff and AIS program managers in the Great Lakes region to determine the information and coordination needs of these groups. The survey results were then used to form the agenda of the meeting, which was planned through a series of committee meetings in the first half of 2021.

Key personnel for planning the third GL BIOTIC Symposium include:

- GLP OIT Committee chairs

- Francine MacDonald, Ontario Ministry of Northern Development, Mines, Natural Resources and Forestry
- Greg Hitzroth, Illinois-Indiana Sea Grant and Illinois Natural History Survey
- GLSGN representatives
 - Doug Jensen, Minnesota Sea Grant
 - Tim Campbell, Wisconsin Sea Grant
 - Sara Stahlman, Pennsylvania Sea Grant
- GLP staff
 - Ceci Weibert
 - Patrick Canniff
- Great Lakes Fishery Commission Law Enforcement Committee staff
 - Jill Wingfield
- Select GLP OIT Committee members
 - Chelsey Blanke, Minnesota DNR
 - Kate Wyman-Grothem, US Fish and Wildlife Service
 - Paige Filice, Michigan State University Extension
 - Gavin Christie, Fisheries and Oceans Canada

Relationship to Plans

The outcomes of GL BIOTIC 3 were well aligned with state, regional and national plans and guidance documents. At a national level, GL BIOTIC 3 helped implement priority actions outlined in the National Sea Grant Strategic Plan Healthy Coastal Ecosystems Focus Area and the Sea Grant 10-year Water Resources Visioning Plan.

National Sea Grant Strategic Plan

- Promoting and supporting healthy coastal ecosystems that are protected from the negative impacts of harmful AIS introduced through the OIT pathway are included in this plan.

Sea Grant 10-year Water Resources Visioning Plan

- Preventing the introduction and spread of AIS is a critical component of maintaining healthy water resources and sustaining robust ecosystems. The outcomes of the GL BIOTIC Symposium directly aligns with Strategic Priorities 2-4 outlined in the visioning document.

Aquatic Nuisance Species Task Force Strategic Plan 2020-2025

- Objective 2.2: Identify priority pathways and species of concern
- Objective 2.3: Encourage implementation of measures to manage high-priority pathways and species
 - A. Develop national strategies for priority pathways (identified in Objective 2.2) and recommend risk management measures.

- C. Expand the implementation of non-regulatory approaches (e.g., best management practices, no trade agreements, public-private partnerships) to prevent the introduction or spread of aquatic nuisance species..

Survey Results

While a general need for additional coordination and information sharing among LE staff and AIS managers was known, what exactly was of interest to these parties was less clear. A targeted group of AIS managers and law enforcement staff from across the Great Lakes region was surveyed by the symposium planning team to better understand the coordination needs of these groups. The survey was loosely based on previous work by Mike Hoff (U.S. Fish and Wildlife Service, retired) that evaluated the perceived risks of different OIT pathways by law enforcement staff. The questionnaire covered five OIT pathways of interest to the GLP OIT committee, authorities held by the respondent’s agency, and their opinions on how the pathway is managed. The questionnaire also asked for specific information and training needs regarding AIS and LE staff.

The survey was sent to 82 AIS managers and law enforcement personnel within the Great Lakes basin that represented state, tribal and federal entities. A total of 34 responses were received for a survey response rate of 41.5%. Each Great Lakes state was represented, multiple US federal agencies, federal and provincial Canadian governments, and a tribal nation were represented. The job roles of respondents were fairly evenly distributed between project management, regulation development, law enforcement and education/outreach.

Table 1: The number of pre-symposium responses from each jurisdiction.

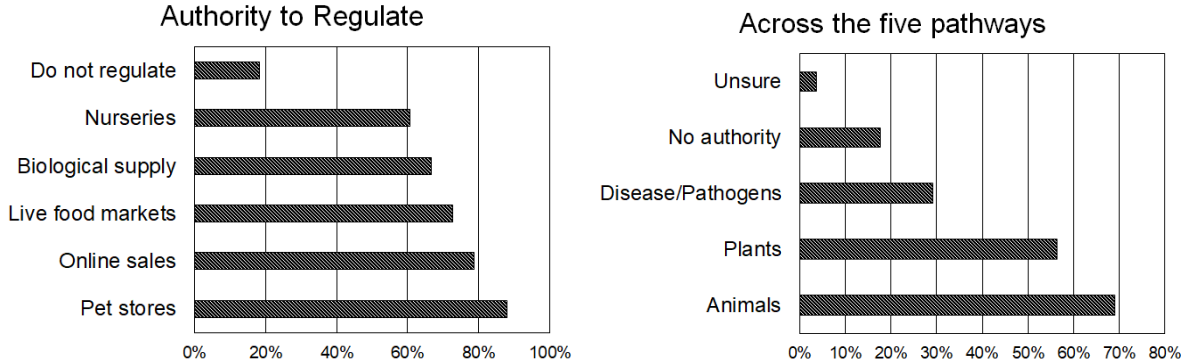
Who	Responses	Who	Responses
Michigan	7	Ohio	2
Wisconsin	4	Illinois	1
Fisheries & Oceans Canada	4	Indiana	1
Canadian provincial government	3	New York	1
State	3	Pennsylvania	1
Minnesota	2	Tribal nation	1

Table #2: The percentage of survey respondents with various job roles.

Job role	Percentage of respondents with role
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Law enforcement	27%
Education/outreach	22%
Project management	21%
Regulation development	21%
Other	9%

Figure 1. The percentage of respondents that had at least some authority to regulate one of the OIT pathways of interest and what taxa were under their authority.



Across the pathways, only a few agencies were able to require registration of vendors, permitting, or reporting of stocks; most were limited to publicly accessible and visible information.

Of the programmatic actions that were included in the survey, respondents generally believed that programs were doing a good job investigating violations and issuing citations for those violations. They also believed that there was adequate support to prosecute those violations. There was general agreement that AIS and enforcement programs could be improved by adding staffing and effort, increasing funding, developing new tools to address OIT pathways, and better training staff on existing tools that can be used for enforcement. Across almost all of the topics, though, there was a lot of uncertainty on how we are doing with these issues.

There was good consensus across respondents on what AIS and LE topics they want to learn more about or spend effort on in future training sessions. Prioritizing OIT pathways for enforcement and AIS training for LE were two of the most highly ranked items. Hearing more case studies on investigations into illegal activity was also highly rated.

However, while there was generally consensus among the survey respondents, the data did reveal some disconnects between AIS managers and LE staff. Perhaps the biggest difference is the need for sharing perspectives between AIS managers and LE staff. While both agreed that

additional AIS training was needed for LE staff, AIS managers thought that hearing about LE perspectives on AIS enforcement was second lowest ranked item for AIS managers while LE staff thought it was the second most important thing to hear more about. This could indicate that AIS managers think they understand LE perspectives, while LE staff believe AIS managers could still learn more. Minor differences in adequacy of program elements existed, such as LE staff believing penalties for online sales were inadequate, could be further investigated to improve AIS and LE programs.

A copy of the GLP OIT Committee survey of LE staff and AIS program managers can be found here (go.wisc.edu/9gg3uw).

Overview of agenda and structure

The GLP OIT Committee believed that the best format for engaging participants with these issues would be presenting case studies that they are familiar with. These presentations would then be followed by small group discussions to process some of the information and brainstorm possible solutions. Each day of the symposium followed this format and had the added benefit of encouraging connections between law enforcement and AIS managers.

Day 1: Bringing Law Enforcement and AIS Managers Together

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|-----------|---|
| 2:00 p.m. | Session welcome and introductions <ul style="list-style-type: none">● Francine MacDonald, Ontario Ministry of Natural Resources and Forestry (MNRF)● Greg Hitzroth, Illinois-Indiana Sea Grant |
| 2:10 p.m. | Purpose and goals of symposium <ul style="list-style-type: none">● Doug Jensen, Minnesota Sea Grant● Jill Wingfield, Great Lakes Fishery Commission● Tim Campbell, Wisconsin Sea Grant● Eric Fischer, Indiana Department of Natural Resources (DNR), Great Lakes Panel on Aquatic Nuisance Species |
| 2:30 p.m. | Law enforcement and AIS manager survey results <ul style="list-style-type: none">● Tim Campbell, Wisconsin Sea Grant |
| 2:50 p.m. | Case studies in law enforcement coordination with AIS managers <ul style="list-style-type: none">● Transport of live invasive carp and the evisceration requirement<ul style="list-style-type: none">○ Ontario MNRF (invited)● Shipment of red swamp crayfish to Ontario<ul style="list-style-type: none">○ Mike Feagan, Michigan DNR● Pet crayfish distributor and the importance of documentation<ul style="list-style-type: none">○ Bob Stroess, Wisconsin DNR |
| 3:10 p.m. | Small group discussion on case study takeaways |
| 3:25 p.m. | Break |
| 3:35 p.m. | Case studies in law enforcement coordination with AIS managers <ul style="list-style-type: none">● AIS manager and law enforcement coordination in Illinois |

- Kevin Irons, Illinois DNR
 - AIS manager and law enforcement coordination in Michigan
 - Sarah LeSage, Michigan Department of Environment, Great Lakes, and Energy
 - Wisconsin organisms in trade pathway group
 - Amy Kretlow, Wisconsin DNR
 - Clarifying pet industry regulations, enforcement responsibilities and enforcement authorities
 - Terry Short, Michigan DNR
 - Matt Leibengood, Ohio DNR
- 4:00 p.m. Small group discussion on case study takeaways
- 4:15 p.m. Closing session
- All
 - Report out on common themes from small group discussions
- 4:30 p.m. Adjourn and look ahead to the next two days

Case studies - Law Enforcement with AIS

A first set of case studies was shared from a LE staff perspective. These case studies were all examples of how LE staff and AIS managers worked together to address an OIT issue, but due to a lack of previous communication and coordination, addressing the issue was perhaps more difficult than it could have been.

- Transport of live invasive carp. Presented by Brenda Koenig, Ontario Ministry of Natural Resources and Forestry.
 - In the past, regulations for import of invasive carp into Ontario required them to be dead. However, there were instances of live carp being imported because fish haulers wanted their product as fresh as possible and would ship them live in water, and would drain the water before crossing into Ontario on the assumption that lack of water would meet the requirement for the fish to be dead. In several situations, invasive carp were able to survive the lack of water e.g. for periods up to 48 hrs after being out of water. This presented high ecological risk and challenges for promoting compliance.
 - The Law Enforcement Committee developed a position statement that asked Great Lakes jurisdictions to adopt and promulgate regulations that would make it unlawful for any person or entity to possess, import or sell individuals of the invasive carp species unless they are dead and eviscerated. This statement provided support to help change laws in Canada
 - After the new rules on invasive carp were implemented there was a significant drop in fines as a result of the clearer and more enforceable regulation.
- Intercepting an international shipment of red swamp crayfish. Presented by Mike Feagan, Michigan DNR.
 - A 2,000 pound shipment of live red swamp crayfish was confiscated at 5 p.m. on a Friday. This is not an ideal time to make such a confiscation due to the logistics associated with managing a confiscation with many prohibited species.

- In this case, a biologically secure facility was found after many phone calls and discussion with partners. The crayfish were frozen and then incinerated.
- Difficult-to-manage scenarios can happen after hours and during inconvenient times. Programs need to be prepared to respond to situations like this. This includes being able to contact anyone that could have a role with response.
- Pet crayfish distributors. Presented by Bob Stroess, Wisconsin DNR.
 - We need to recognize that few LE staff and AIS managers are aware of issues that are occurring on a larger scale. There needs to be a communication chain to ensure that news of even minor OIT violations gets to the right people at various levels within the organization
 - We should document outreach efforts so records exist that might help avoid duplication of work and help prosecute a case if needed. A centralized record-keeping system or process within a program can help achieve both of these goals. It will help justify enforcement actions against a particular business that continues to violate regulations after being educated, and it will increase the efficiency of organizations.
 - We need to stop operating in silos. Our programs can be more effective if we operate in collaboration with the other programs.

Case studies - AIS with Law Enforcement

A second set of case studies was shared from an AIS manager perspective. These case studies were intended to highlight examples of good coordination and communication among LE staff and AIS managers.

- AIS manager and LE staff coordination in Illinois. Presented by Kevin Irons, Illinois DNR.
 - There are good relationships between AIS staff and LE staff in Illinois, and it has made it easy to leverage each other's strengths. This has led to quick enforcement action when needed by AIS managers and quick identification skills when needed by LE staff.
 - Investigating one smaller OIT issue can lead to the discovery of larger violations that can be pursued and could fix larger structural problems that impact multiple natural resource issues.
 - The Illinois AIS program has had success charging a violator in multiple states. A New York company was charged by New York conservation officers for violating Illinois regulations while also being charged for violating different New York environmental standards.
- AIS manager and LE staff coordination in Michigan. Presented by Sarah LeSage, Michigan EGLE.
 - Michigan's invasive species program is cooperatively implemented across agencies recognizing and using each department and division's unique commitments, authorities and expertise. The program is coordinated via

interdepartmental aquatic and terrestrial invasive species core teams and workgroups.

- Program successes include interdepartmental efforts on red swamp crayfish and parrot feather, and outreach programs that address on-the-ground responses as well as pathway work by DNR law enforcement and Department of Agriculture nursery inspectors.
- Michigan has dedicated LE staff that work on these teams who are trained in these issues in order to better respond to violations.
- The Wisconsin OIT Pathways Working Group. Presented by Amy Kretlow, Wisconsin DNR.
 - Wisconsin created a working group consisting of different state agencies, universities and LE staff that have a role in managing OIT pathways.
 - The group helped produce protocols for all entities working on OIT monitoring and enforcement in Wisconsin pet stores.
- Overcoming enforcement obstacles for the pet trade in Ohio. Presented by Matthew Leibengood, Ohio DNR
 - There are not currently established relationships between pet trade businesses and enforcement agencies in Ohio.
 - Getting LE staff monitoring AIS in pet stores is challenging because they are already on the fence about participation in AIS activities, so being involved in the pet trade can seem like a stretch to staff.
 - Policy changes are needed for any meaningful increase in the amount of time officers spend on AIS to occur. This could include staff expansion that would allow LE staff to focus on OIT regulations in Ohio.
 - There is a need for increased outreach and communications on OIT issues since many citizens are just unaware of the laws regarding AIS.

Discussion Summaries

After both sets of presentations, attendees broke out into small group discussions to share stories similar to the presentations. Attendees discussed noteworthy ideas from the presentations while also highlighting actions that could be implemented in the near future. Specifically, participants were asked:

- Do you have a similar example you could share?
- What was something that stood out to you from the stories that were shared?
- Is there a lesson or point from the stories that you feel like you could implement now?

Below are key points from the discussions.

- We can improve how outreach and management activities are conducted to support LE staff action and their ability to prosecute OIT violations.
 - AIS managers can do a better job at keeping accessible records of outreach and contacts that can be used for law enforcement efforts.

- Outreach and management staff can facilitate relationship building during already existing events and projects with OIT stakeholders.
- AIS managers can better support LE staff with technical skills like identification or through policies like pet store registration.
- Communication protocols should be formalized to ensure the right people across agencies are being contacted for OIT issues.
 - There is a need to place more value on relationships among people in different departments and agencies. If these relationships don't exist, we should proactively foster and build them, making it someone's job to build these relationships if necessary. Dedicate the necessary effort to maintain these relationships.
 - Ensure communication includes both what an entity can and cannot do in various situations.
 - These relationships can help retain institutional knowledge and maintain our collective progress on these issues.
- There is a need to break down silos in agencies and work better across agencies and entities working on the same issues.
 - Increased funding for collaboration efforts can help with this, and with increased collaboration, other OIT issues will likely be addressed.
 - Dedicated OIT LE staff can also help with collaboration. They can develop expertise on OIT issues and make larger connections than field officers who only have a small percentage of time dedicated to OIT enforcement.
 - There is interest in establishing a way to recognize LE efforts on OIT to both increase awareness of these issues and make the work more attractive to LE staff.
- More industry involvement is needed, with a specific need to engage more with pet stores.
 - Due to staff turnover at many pet stores there is a need to develop an efficient way to continually educate new employees.
 - We need to better understand how often we should be visiting and engaging with OIT businesses.
 - A positive outcome of the zebra mussel contaminated moss ball response was that it provided a concrete reason for organizations to develop relationships with pet trade retailers. We should capitalize on these efforts.

Day 2: Tools to Improve Knowledge and Detection of Species in the Organisms in Trade Pathway

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| 2:00 p.m. | Session start-up and introduction to session topic <ul style="list-style-type: none"> • Francine MacDonald, Ontario MNRF • Greg Hitzroth, Illinois-Indiana Sea Grant |
| 2:15 p.m. | Development of tools and training: Identification handbook for law enforcement use in bait shops <ul style="list-style-type: none"> • John Navarro, Ohio DNR |
| 2:25 p.m. | First use of a compliance order under Ontario's <i>Invasive Species Act, 2015</i> <ul style="list-style-type: none"> • Brenda Koenig, Ontario MNRF |
| 2:35 p.m. | Detection technology and use of eDNA tools to make pathway detections: LAMP |

- assays
 - Jon Amberg, U.S. Geological Survey
- 2:34 p.m. Creative policy solutions to gaps in authority: Michigan Registration to Sell Aquatic Organisms program
 - Susannah Lott, Michigan Department of Agriculture and Rural Development
- 2:55 p.m. AIS LE units: logistics and processes for organizing and maintaining effort
 - Brandon Fehrenbacher, Illinois DNR
 - Nick Torsky, Michigan DNR
- 3:05 p.m. Break
- 3:20 p.m. Working session
 - Breakout sessions
- 4:20p.m. Closing session
 - Participants report from working sessions
- 4:30 p.m. Adjourn

Presentations

- Development of tools and training: Identification handbook for law enforcement use in bait shops. Presented by John Navarro, Ohio DNR.
 - The Ohio Field Guide to Invasive Species has worked well to share what species require additional action by the Ohio DNR and what species are widely established in the area.
 - The Live Bait and Angling guide is being used to show what invasives are likely to come through bait trade. It can help identify native species that look like invasive species and is available at bait store outlets.
 - There is a need for a pet trade guide. It would be a way to provide staff easy identification tools for species of concern in pet stores or online. Other partners have agreed that a regional guide of plants and animals would be useful for the Great Lakes. The Great Lakes Fishery Commission Law Enforcement Committee would be a good partner for this effort.
- First use of a compliance order under Ontario's *Invasive Species Act, 2015*. Presented by Brenda Koenig, Ontario MNRF.
 - The Enforcement Branch has had an Action Plan on AIS in place since 2014 where the focus has been on looking at industries that may be vectors of spread in Ontario (e.g., bait fish, water garden supply stores, food fish, pet/aquarium supplies).
 - Compliance orders under the Invasive Species Act may be issued under section 25.
 - Compliance orders are helpful in cases where it is not easy to seize the prohibited organism and where follow-up may be required.
 - Ontario's first compliance order was issued in 2020 for Brazilian waterweed (*Egeria densa*). After a positive DNA match, an order was issued to the individual

to stop distribution and properly dispose of the plant. A species-specific fact sheet was drafted and presented to the individual to help them understand the problem. Detailed disposal instructions were included, which resulted in successful compliance.

- Detection technology and use of eDNA tools to make pathway detections: LAMP assays. Presented by Jon Amberg, U.S. Geological Survey.
 - eDNA can detect DNA in water, soil and air and remains a simple process for labs processing these samples.
 - Most eDNA work currently entails field samples that are brought to a lab to be extracted and processed. This approach is often intensive and time consuming. There is a desire for an eDNA test to use at the source that is easy to use and has a rapid turn-around time.
 - Loop mediated isothermal amplification (LAMP) is used regularly in medical diagnostics. Tests run at standard temperatures and results are available within 40 minutes, which could make it ideal for processing samples in the field.
 - To test effectiveness, a LAMP assay was developed for silver and bighead carp. It was tested to see if it could detect a single carp in a tank of 35,000 minnows.
 - The LAMP test was able to detect a single carp, but a better signal was received when more carp were in the bait shipment.
 - The probability of detecting a single fish can be improved by increasing the number of replicates. In this test system, six replicates with a positive and negative control had a 95% chance of detection when the fish was in the tank for over two hours.
 - The LAMP assay is very simple to use. There was no significant difference in detection probability between expert and novice users.
 - In a test for detecting round gobies, field-based LAMP test results were comparable to lab-based qPCR, and the LAMP assay has the ability to detect organisms in lakes, not only clean field environments.
 - The USGS Upper Midwest Environmental Science Center is currently working on validating the assay to meet forensics standards for use in dreissenid mussels.
 - The unit to read the strips costs around \$10,000 and strips run ~\$70-\$100/strip.

- Creative policy solutions to gaps in authority: Michigan registration to sell aquatic organisms program. Presented by Susannah Lott, Michigan Department of Agriculture and Rural Development
 - The Michigan Natural Resources & Environmental Protection Act (NREPA) covers transgenic and non-native organisms and prohibits the live possession, introduction and sale of 44 aquatic and wetland species.
 - In 2011 part 414 was enacted and mandated that an AIS advisory council be added to NREPA which would make recommendations to legislature and the governor on AIS-related topics.

- In 2018, an annual seller registration and sales reporting requirement to sell live nonnative aquatic organisms was added to part 413.
 - The new law regarding registration was communicated through numerous outlets from direct contact with industry leaders to social media and outreach materials.
 - Registration requires Michigan sellers to provide information on where aquatic organisms are being sold and to display a certificate of proof of registration at the place of sale.
 - Sellers are also required to annually report which species, in categorical quantities, were sold in Michigan, which helps with traceability.
 - Compliance and enforcement are done through the Michigan Department of Natural Resources Law Enforcement Division (fish and crustaceans) and Michigan Department of Agriculture & Rural Development Pesticide and Plant Pest Management (plants).
 - Plans are in development to compare registration with reporting compliance and identify businesses that need in-person follow-up.
- Dedicated AIS law enforcement units: logistics and processes for organizing and maintaining effort. Presented by Brandon Fehrenbacher, Illinois DNR and Nick Torsky, Michigan DNR.
 - The Invasive Species Unit (ISU) was created in July 2012 in response to the increased need for law enforcement to focus on pathways that spread invasive carp and was soon expanded to include all invasive species.
 - The ISU has had significant enforcement cases in nearly every industry and has collected over \$150,000 in restitutions from plea agreement cases that can be used for LE programs.
 - Benefits:
 - The ISU allows officers to build long-term relationships with other AIS personnel and those within the industry they regulate.
 - It provides capacity and time to gather intelligence and develop effective techniques to accomplish OIT enforcement goals.
 - The unit provides a direct contact for internal and external partners, increasing efficiency.
 - The unit provides training to newly hired and current CPOS to increase capacity across the agency.
 - This all creates a robust OIT enforcement branch within the agency.
 - Areas that need improvement:
 - Current positions within ISU are not full-time.
 - Need a full-time ranking position (sergeant or lieutenant) to assist with agency-level decision making.
 - A lot of time is spent interpreting law and the legality of certain decisions.
 - There needs to be a way to document current decisions and efforts to aid future officers working with the ISU.

- Better enforcement techniques need to be developed to address the selling and trading of AIS on the internet.
- Michigan shares many common themes with Illinois, including working well across agencies and lack of funding for certain efforts.
- Michigan does not have any full-time staff dedicated to OIT. Instead Michigan has specialists and corporals that are assigned to the Great Lakes enforcement unit and are positioned throughout the state of Michigan. They have the flexibility to work on OIT issues.
- Most AIS work occurs in the greater metropolitan areas with focus on wholesale fish sales.
- Michigan has 11 officers and 3 supervisors who can work on OIT issues, which allows for a large amount of effort when officers are needed for large-scale initiatives.

Discussion Summaries

After presentations, attendees broke out into small groups to discuss not only the previous presentations but also actions that could be implemented in the near future. Discussion questions included:

- How is your work influenced by and/or making an impact on pathway detection and the topics discussed today?
- How does your jurisdiction confirm identifications (e.g., genetics, taxonomy, etc.)? What could be improved about this process?
- Is eDNA an appropriate tool to pursue for pathway detection? What other work is needed to make this a feasible tool for law enforcement (both research and applicability, e.g., handheld)? What policy/regulations need to be in place to support use of this technology? Is eDNA strong enough to use as evidence for enforcement action?
- What authorities are needed to facilitate use of detection tools (e.g., authorities to inspect in order to make a detection)? What actions can an agency take in the case of a detection?
- What policy or outreach tools/solutions could be used to make enforcement easier in the absence of clear authorities or knowledge?

Below are the key points from the discussions. Comments are broken up into four themes that were discussed the most among participants.

- More and better tools are needed to help with AIS Identification, such as:
 - Better training for law enforcement staff on AIS identification. A standard set of photos or guidance on how to take proper photos for identification would be beneficial.
 - A basin-wide print and online guide to help officers and pet store workers identify species would be very useful.
 - More invasive species identification and reporting training within the pet trade industry.

- A current national expert list to allow expertise to be shared across the region.
- We need more and better internal and external communication.
 - Generic templates for compliance orders that officers and staff can use would be useful. They could include relevant outreach products to help violators come into compliance.
 - Stronger relationships between technical staff and enforcement would allow these groups to better help one another.
 - Increased internal coordination can improve knowledge of authority and responsibility in terms of online sales.
 - Sharing case studies of successful enforcement would illustrate how successful enforcement can occur. This could include various communications that need to be tracked by AIS managers.
 - It is important to have internal/external contact lists for notifying various agencies, enforcement officers, communications staff, etc.
 - There is a need to increase engagement and communication between retailers and distributors.
- Using eDNA tests for detecting AIS in the OIT pathway.
 - It is important to think about and define the cost/benefits of eDNA approaches.
 - There is a need to understand how, if possible, eDNA could be used in court cases. This includes tying eDNA test results to specific locations.
 - A drawback is that a physical specimen is still likely needed as burden of proof for enforcement.
 - It is increasingly important to see where eDNA has been used successfully in enforcement and in court. This information needs to be shared.
 - The development of eDNA markers needs to be coordinated so each jurisdiction isn't developing their own markers in isolation. If markers have already been developed in one jurisdiction, there needs to be a way to make them easily discoverable and usable for others.
 - LAMP eDNA testing could be a useful screening tool that reduces time needed for enforcement actions.

Day 3: Communication and response tools to improve pathway management and enforcement

- | | |
|-----------|---|
| 2:00 p.m. | 1. Session start-up
Francine MacDonald, Ontario Ministry of Natural Resources and Forestry
Greg Hitzroth, Illinois-Indiana Sea Grant |
| 2:10 p.m. | 2. Tools to improve coordination in response efforts and related communications
Jill Wingfield, Great Lakes Fishery Commission <ul style="list-style-type: none"> ● Joint Forces Committee Doug Jensen, Minnesota Sea Grant |

Tim Campbell, Wisconsin Sea Grant

- AIS communication forums

Rochelle Sturtevant, NOAA-GLANSIS

- USGS-NAS and NOAA-GLANSIS databases

Ceci Weibert, Great Lakes Commission

- Great Lakes St. Lawrence Governors and Premiers' Mutual Aid Agreement

- 2:25 p.m. 3. Case studies: Response to zebra mussel infestation of moss balls in pet/aquarium retail
- What communication tools were used.
 - What did response look like/what actions were taken?
 - What went well in the response, communication and coordination efforts?
 - What gaps in authority/response did this event and subsequent response highlight? (roadblocks/what could be improved)
- a) U.S. federal response and coordination
- Craig Martin, U.S. Fish and Wildlife Service
- b) Canadian federal response and coordination
- Susan Roe, Fisheries and Oceans Canada
- c) Western state response and coordination
- Stephen Phillips, Pacific States Marine Fisheries Commission
- d) Great Lakes state response and coordination
- Eric Fischer, Indiana DNR
 - Amy Kretlow, Wisconsin DNR
- 3:15 p.m. Break
- 3:30 p.m. 4. Working session - All
- Participants will discuss the following questions:
- What state/province-specific communication channels are in use, and by whom?
 - Would Great Lakes conservation LE and AIS/natural resource managers benefit from a formalized communication protocol, platform or system? If so, what does that look like?
 - How does law enforcement fit into the Mutual Aid Agreement? Is there additional work needed to make this process more convenient/conducive to interjurisdictional and interagency coordination?
- 4:10 p.m. 5. Symposium closing session - All
- Report out from all working sessions
 - Recap progress and high-level discussions of the previous days
 - Review next steps and ideas/needs for fall meeting
- 4:30 p.m. 6. Adjourn

Tools to improve coordination in response efforts and related communication

- The Great Lakes Fishery Commission and the Joint Forces Committee
 - 2017 the govs and premiers signed a resolution to enhance enforcement efforts for AIS. The resolution called on all agencies to join the Joint Forces Committee. It is the chosen tool to aid cross border relationships among LE officers.

- There is an MOU that each agency has signed that improves interjurisdictional work. All 8 Great Lakes states and the provinces of Ontario and Quebec have signed.
- Knowing your state or provincial contact for the Joint Forces Committee will help with communications.
- AIS Communication Forums
 - Within Wisconsin, an AIS email list is used reach AIS partners while a response communication framework with defined roles and responsibilities helps reach the right people with necessary information.
 - Regional ANS panels have large and well-connected distribution networks. They can be effective means of communicating time sensitive AIS information.
- USGS NAS and GLERL GLANSIS databases
 - One aspect of these databases is to deliver tools and information to aid in early detection and rapid response.
 - Distribution maps and species profiles are readily available.
 - Alert systems are available for new findings.
 - Access both at the links below:
 - <https://nas.er.usgs.gov/>
 - <https://www.glerl.noaa.gov/glansis/>
- Great Lakes St. Lawrence Governors and Premiers' Mutual Aid Agreement
 - If the mutual aid agreement needs invoked, an Interjurisdictional Early Detection Rapid Response Communication Plan is needed quickly communicate with all partners.
 - The plan does not supersede state-specific communication protocols and will be used in tandem with those existing state plans.
 - Covers all non-fish taxa and only applies to organisms-in-hand.

Presentations for day three of the OIT symposium were focused on the response to the 2021 discovery of zebra mussels in marimo moss balls. This case study provided a unique opportunity to use a recent example that many meeting attendees had experience with to cover the following topics:

- The communication tools used in the response.
- The actions that were part of the response.
- The successful communication and coordination efforts that were part of the response.
- The gaps in authority or response efforts this event highlighted.
- U.S. federal response and coordination. Presented by Craig Martin, U.S. Fish and Wildlife Service.
 - This was a unique problem that crossed jurisdictions and authorities. It was also an active LE investigation, which complicated the sharing of information across partners.
 - State use of possession and sale authorities to quarantine moss balls was very effective. Those actions combined with voluntary actions by industry helped make the situation more manageable.
 - Future shipments of moss balls will enter the US through two ports of entry and will be screened using eDNA sampling.
 - Incident Command System (ICS) would have been very useful for this response. A nationally coordinated Early Detection Rapid Response (EDRR) framework for AIS would also have been useful.

- Canadian federal response and coordination. Presented by Susan Roe, Fisheries Oceans Canada.
 - Canadian federal response and coordination
 - Susan Roe, Fisheries Oceans Canada (DFO)
 - Canadian response was taken in close collaboration among federal, provincial and territorial authorities to stop the import of moss balls infested with zebra mussels; to prevent retail distribution of moss balls already in Canada; and minimize risk posed by moss balls already in the possession of the Canadian public.
 - Some federal actions were constrained by limited legal authorities. While zebra mussels are prohibited from importation under the federal AIS regulations, neither moss balls nor zebra mussels are covered by other federal legislation. The Canada Border Service Agency was able to issue border targets to intercept shipments while DFO fishery officers were able to issue directions to stop import, dispose of moss balls and decontaminate aquaria.
 - Most DFO fishery officers are located near coasts and fishery operations, which made it difficult to address inland OIT issues.
 - ICS was implemented to coordinate the response efforts nationally. This approach was essential to success and maximized available resources.
 - A science advisory committee was established to provide science-based guidance to test moss balls for the presence of zebra mussels, dispose of moss balls and treat aquaria
 - An unforeseen challenge was the need for an emergency use registration from the Pest Management Regulatory Agency for the use of salt and bleach to treat aquaria.
 - Global Affairs Canada helped to identify potential suppliers in Ukraine, but geopolitical challenges made it difficult to engage with Ukrainian authorities.
 - It was difficult to reach e-commerce retailers, but once the right contact was made there was good compliance across retailers to block the sale of moss balls in Canada and across North America.
 - An after-action report has been produced.
- Western state response and coordination. Presented by Stephen Phillips, Pacific State Marine Fisheries Commission.
 - The 2008 Columbia River Basin Quagga and Zebra Mussel Response Plan, which is ICS-based, was used to respond to the moss ball event. The region has 10+ years of ICS training to help implement this plan.
 - Additional state agencies joined the Columbia River Basin response to moss balls to better coordinate across the region.
 - Completed a Moss Ball Incident Action Report. [Available](#) online.
 - A national forum or ICS would fill a need for federal-state coordination and information sharing for similar issues.
 - There is a need to identify gaps in federal regulations and authorities on the importation of products. These regulations and authorities may have the unintended consequence of being too specific, leading to an inability to take necessary action later.
 - Managers and law enforcement staff should consider what can be done to support legislation that might help states and the federal government respond to similar issues in the future.
- Great Lakes states response and coordination, presented by Eric Fischer, Indiana DNR, and Amy Kretlow, Wisconsin DNR.
 - Indiana issued stop sales orders to help bring retailers into compliance.

- Initial rapid response efforts primarily consisted of site visits from two high-level staff followed by the assistance of the nine regional IN DNR nursery inspectors and compliance officers to encourage voluntary compliance and enforce the stop sale orders.
- Indiana leveraged multiple communication channels, including press releases and social media platforms, to extend reach of message.
- Ultimately Indiana's efforts were viewed as successful because of good communication among the state and federal agencies and other states, as well as being able to utilize existing regulations and regulatory authorities to respond rapidly to the evolving threat.
- The WDNR coordinated efforts across county and nonprofit staff to check pet stores for contaminated products. All counties that had a pet store had a visit from AIS staff.
- A potential difficulty in Wisconsin is that while any store that sells more than \$250 in plants needs to be registered as a licensed nursery, no similar requirement exists for pet stores. It is hard to have an accurate list of pet stores in Wisconsin.
- Some retailers had removed product within a day of the Wisconsin DNR receiving the news, so news obviously spread quickly through other channels.
- Still, retailers were very happy to hear from local AIS staff, even if they had heard from other sources about this issue.
- Current WDNR communication protocol works well at the regional level, but it might need to be adapted for statewide efforts like the moss ball incident.

Discussion Summary

After the case studies, attendees were asked to discuss the following questions:

- What state/province-specific communication channels are in use, and by whom?
- Would Great Lakes conservation LE and AIS/natural resource managers benefit from a formalized communication protocol, platform or system? If so, what would that look like?
- How does law enforcement fit into the Mutual Aid Agreement? Is there additional work needed to make this process more convenient/conducive to interjurisdictional and interagency coordination?

Across the discussion groups there was broad support for additional and more formalized communications between LE and AIS managers. All of the small group discussions came to this point after discussing the specific questions posed to the groups.

- There needs to be an increased understanding and effort to learn from existing communication channels that can help address these issues.
- We should explore a structured approach to communication, similar to ICS, for Great Lakes AIS managers and LE so we can better respond to OIT incidents like these.
- Develop more formal conservation officer enforcement plans to outline who does what within taxa or pathways. This can help identify gaps in authorities that could help in future enforcement issues.
- Continued joint law enforcement and AIS manager meetings will promote stronger relationships and understanding of case studies in advance of crises and necessary actions.
- We can improve understanding of how staff fit into existing communication and response protocols.

Supplemental Resources

Full AIS Manager and Law Enforcement Staff Survey and recruitment material

- go.wisc.edu/9gg3uw